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U.S. Army Communications - Electronics Command

Fort Monmouth, New Jersey 07703

CECOM Supplement 1

1 April 1987

to DARCOM-R 702-24

Product Assurance

MATERIEL DETERIORATION, PREVENTION AND CONTROL

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Issue of further supplements to this regulation by CECOM subordinate elements is prohibited unless specifically approved by Commander, CECOM,

ATTN: DRSEL-PA-M.

DARCOM-R 702-24, 16 October 1979, is supplemented as follows:

Page 1, paragraph 2, Scope. Add the following:

This supplement applies to all directorates, offices, activities, and project/program/product managers of the US Army Communications-Electronic Command (CECOM).

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Page 3, paragraph 3, Explanation of Terms. After subparagraph h, add subparagraphs i through x.

i. Corrosion expertise. The special skills and knowledge possessed by technical specialists of the Development Centers, Project Management Offices, and Directorates of Product Assurance and Test, Engineering, Procurement and Production, and Materiel Management, who are experts in such areas as the design of deterioration resistant electronic hardware, selection of stable electronic materials, minimization of excessive galvanic couples, stress/strain relief techniques, leak proof enclosures, electronic failure mechanism, cleaning and drying procedures, process controls, preventive maintenance techniques, properties of metals, plastics, electronic technology, which are applicable to CECOM systems. Also such electronic material areas as: dielectrics, solders, fluxes, cleaning, resins, adhesives, sealants, electroplated coatings, chemical conversion coatings, paints, inorganic and specialty coatings, and the corrosion and deterioration behavior of electronic materials in storage and service environments. This technical group may also include industry experts serving as consultants and other DOD experts.

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j. CECOM Materiel Deterioration Prevention Liaison Personnel.

Representatives from applicable CECOM organizations knowledgeable in the technical discipline of electronic materiels and the selection of designs and electronic materials for the protection of Communications-Electronics equipment or specific components or subsystems. These individuals will be familiar with protective designs, electronic materials, finishing methods and their selection rationale.

k. CECOM Materiel Deterioration Prevention Technical Working Group.

CECOM Corrosion Expertise and Materiel Deterioration Liaison Personnel serving under the chairmanship of the CECOM Deterioration Prevention Action Officer or his/her representative.

l. CECOM Materiel Deterioration Prevention Action Office (DPAO). The management site for all CECOM deterioration prevention efforts and other responsibilities assigned by DARCOM-R 702-24. Organizationally, the DPAO is located within the Product Assurance and Test Directorate and the Action Officer shall be the Chief, Technology and Test Management Division (DRSEL-PA-M).

m. Deterioration Prevention Program Plan (DPPP). A plan to be prepared, by the contractor or in-house. This plan will define the scope and depth of the contractor's efforts for materiel deterioration prevention and control based upon the contents of appendixes A and B, DARCOM-R 702-24.

It shall be applicable only when cited as a contractual requirement and for programs within and beyond the scope of MIL-P-11268; which shall normally be cited.

n. Deterioration Prevention Requirement Document. A document to be included in all scopes of work for CECOM systems and associated equipment. MIL-P-11268, with all the other specifications it references and/or appendix A, basic regulation, may serve as such a document, to be used in CECOM research and development, procurement and production, and supply and maintenance efforts under the jurisdiction of organizational elements within the purview of this supplement. A similar document will be used when efforts are accomplished in-house. The requirements may also be included as part of the equipment specification.

o. Prevention of Electronic Materiel Deterioration. Action to preclude the deterioration of materiel including system assemblies, subassemblies, modules, parts, and to retain the ability of such systems in fulfilling the functions for which they are intended without loss of availability and increase in maintenance that can be attributed to deterioration of materials, hardware and electronic function, due to exposure and storage in the military environment.

p. Controls: Specifying and maintaining the preferred and updated quality levels of parts, materials, processes, design criteria and other factors, the control of which will prevent deterioration of the system during its predicted field service life.

q. MADPAC Plan: A plan in accordance with DARCOM-R 702-24 and this supplement, prepared by the system contractor, which details steps and controls, during all acquisition phases, which will assure prevention of deterioration.

r. (TEMP): Test and Evaluation Master Plan. Which is designed to measure the ability of the system design and its protective measures to withstand deteriorative conditions during field usage and storage by means of simulated environmental tests.

s. Storage Serviceability Standard (SSS). A standard which specifies packaging for transportation (ie: transit cases), storage conditions, if special, special items, ie: batteries, electrolytic capacitors, etc., which have a shelf life and require periodic inspections and performance checks necessary during extended storage periods to prevent deterioration of the materiel performance.

t. Maintenance Manual: A manual which will specify cleaning methods specifically for electronics safe cleaning materials, finish touch-up procedures and replacement criteria of degraded parts, modules, hardware and complete system equipments. Prevention maintenance measures will also be included.

u. Operators Manual: A manual which includes instructions to the operator to utilize his electronic equipment in a clean and dry condition, as is feasible, how to perform preventive maintenance usage, and operation, and to be alert to any deterioration. Also, to utilize QDKs to report failures of LRU's, modules, parts and to return such items for failure analysis at designated centers or repair depots.

v. Depot Maintenance Work Request: A work request for Depots which lists and describes maintenance, repair, overhaul and test procedures for new and overhauled systems in storage and equipment from the field requiring overhaul and/or repair.

w. Deterioration: The loss of performance capability of electronic equipment system or the degradation of physical, dielectrical, and electronic function properties of materials and assemblages due to a reaction to or an effect of severe field or storage environments, and/or time aging effects.

x. Technical Need Project (TNP). A proposal prepared by the PA&T to the CPC lead activity at the Army Materials Technology Laboratory (MTL) pertaining to the analysis of deterioration data with a view towards Technology Need Projects and resolving areas of a deficiency with a need for corrective actions.

Page 3, paragraph 4, Policy: Add subparagraph h as follows:

h. An effective MADPAC Program will be established and maintained within CECOM to:

(1) Assure that all materiel, including electronic systems are developed, designed and manufactured to perform, within their specified operating characteristics for a specified field service life under the adverse environmental conditions that may be encountered during storage, transportation and tactical use in Army environments and intended platform use.

(2) Insure that the ROC, Letter of Need and/or RAM Plan will describe Mission Profiles, Operational Modes, intended platform usage and predicted field service life and limits of environmental extremes for which deterioration prevention protection is needed.

Page 4, paragraph 5, Responsibilities and Functions. Add subparagraphs o through t after subparagraph n(2).

o. The Director of Product Assurance and Test will:

(1) Implement CECOM policy concerning Materiel Deterioration Prevention and Control (MADPAC) activities.

(2) Establish and adequately staff the CECOM Deterioration Prevention Action Office (DPAO).

(3) Manage the overall CECOM MADPAC program by DPAO actions as follows:

a. The Chief, Technology and Test Management Division, will serve as the technical authority and focal point for deterioration prevention and corrosion control, for information, data, and technical requirements. He/She will establish and chair, or have his/her representative to chair the CECOM Materiel Deterioration Prevention Technical Working Group. With the development of each component, subsystem, or system, a deterioration prevention requirement document will be prepared and submitted, for programs beyond the scope of MIL-P-11268, to the CECOM Materials Deterioration Prevention Technical Working Group for approval.

If the requirements of MIL-P-11268 are sufficient, that document shall be used instead of either a more extensive program plan or appendix A, basic regulation. Any changes to the deterioration prevention requirement document will be coordinated and approved by the CECOM Materiel Deterioration Prevention Technical Working Group.

(b) The Manager of the DPAO will utilize the assigned liaison personnel within CECOM to maintain cognizance of design rationals for materials and finishes selection, to more effectively monitor and/or manage deterioration prevention and corrosion control during the equipment life cycle.

(c) The Director, Product Assurance and Test, or his/her representative, will participate in In-Depth Design Reviews, Production Readiness Reviews, and Configuration Control Boards activities via the CECOM Materiel Deterioration Prevention Technical Working Group. Personnel participating in these activities will exercise approval/concurrence authority for technical documentation involving materials deterioration prevention, finishing processes, and protective coating utilization. Corrosion Control efforts will be described in respective System Concept Papers (SPC's) and Decision Coordination Papers (DCP's) at DSARC, ASARC and IPR Levels.

(d). During engineering development, CECOM Corrosion Expertise personnel will identify parts requiring critical finishing processes and will participate in the formulation of the quality assurance provisions necessary to insure each part's reliability throughout the equipment life cycle.

(4) Manage PA&T MADPAC activity other than the DPAO as follows:

(a) Designate the deterioration-cognizant organizational elements or personnel who will participate as members of the CECOM Materiel Deterioration Prevention Technical Working Group.

(b) Implement CECOM deterioration prevention policies and procedures, including utilization of the deterioration prevention and control program requirements.

(c) Incorporate and make maximum utilization and involvement of the expertise of DPAO in every surveillance program for CECOM systems and hardware.

(d) Insure that all concerned personnel are instructed on the causes, effects, and techniques for prevention of CECOM systems deterioration.

(e) Forward to the CECOM DPAO deterioration-related information on the systems supported by the Product Assurance and Test Directorate, including progress reports.

(f) Prepare input for MADPAC in technical data packages for the project managers being supported, subject to their final approval.

(g) Provide attendance and participation at Corrosion Management Steering Group Level (CMSG) and at Corrosion Prevention Advisory Boards (CPAB).

(h) Participate in tri-annual Command Surveys visiting field commands to evaluate the value of Deterioration Prevention Programs.

(i) PA&T will establish and maintain an environmental test facility with supporting failure analysis facilities to conduct studies to determine the causes of deterioration failures, used for improvements, effectiveness of protective techniques and correlation with field exposure studies. The facility will also be used to evaluate new and state-of-the-art technology and designs as to their capability to withstand deterioration. For contractual environmental testing per Group C and D tests required in equipment specifications, the contractor plant facilities will be utilized.

(j) PA&T will prepare and maintain a CECOM Applications Guide and a Deterioration Prevention Training Course for CECOM personnel. These will include the latest design, material use, and protective techniques; which especially apply to CECOM materiel. Updated deterioration prevention technology will be continually incorporated in the Applications Guide, a Training Course for personnel, and for a Technology Needs Program. PA&T will prepare and maintain a computerized source of technical information as follows:

(1) A library of pattern type deterioration failures occurring during environmental test and fielding usage with failure analysis and recommended fixes or TNP's as necessary; including lessons learned and do's and don't's of design and material use.

(2) An extensive library of deterioration prevention literature, handbooks; including AF and Navy electronic type failures.

(3) A library of microphotos to illustrate design and/or material use failures to be shown as examples in training courses.

(k) Insure maximum use of updated state-of-the-art technology in the prevention of deterioration. Particular attention is to be directed toward selecting deterioration resistant materials, designs, protective packaging, coatings, finishes, inherently resistant critical parts and assemblies.

(l) Maintain a Data Collection & Analysis Program which requires data on field corroded items, conducts failure analysis, reduces pertinent data to be entered into an organized data bank, circulates lessons learned, pattern type failure data, and trends; to be used as a Technical Needs Item. The information will be published in a MADPAC news periodical to be circulated within CECOM.

(m) Provide training courses for all personnel involved in development, acquisition and fielding of deterioration resistant materiel.

p. Project/Program Managers and Chiefs of Development Centers will:

(1) Appoint primary and alternate liaison personnel who can serve as points of contact and technical liaison with, or as member of, the CECOM Deterioration Prevention Technical Working Group. Notify the Chief, Technology and Test Management Division (DRSEL-PA-M), of the names of personnel selected.

(2) In order to generate advance technology within its area of responsibility, each management office/center will insure that deterioration prevention and control are major considerations during concept design, demonstration and validation, and development phases of new equipment and components.

(3) Utilize deterioration prevention consultants and expertise available within CECOM and industry through the Deterioration Prevention Action Office. In coordination with DPAO, furnish CECOM representative at selected symposia and conferences. Encourage course attendance on deterioration prevention and control subjects when in the best interest of the CECOM mission.

(4) Provide the DPAO copies of R&D efforts and information on deterioration-related activity on all projects/programs within the sphere of their responsibility along with solutions when available as input for Command MADPAC reports.

q. The Director of Engineering will:

(1) Designate those deterioration-cognizant organizational elements or personnel who will be the Directorate contact and will participate as members of the CECOM Materiel Deterioration Prevention Technical Working Group. Notify the Chief, Technology and Test Management Division (DRSEL-PA-M), of the names of personnel selected.

(2) Incorporate into all technical data packages input regarding MADPAC requirements.

(3) Assure that production drawings contain thorough and complete MADPAC related technical design details.

(4) Forward to DPAO deterioration-related information on the problems and solutions encountered on Production Engineering Activity as input for Command MADPAC reports.

r. The Director of Procurement and Production will:

- (1) Designate those deterioration-cognizant organizational elements or personnel who will act as the Directorate contact and participate as members of the CECOM Materiel Deterioration Prevention Technical Working Group. Furnish the names of personnel selected to the Chief, Technology and Test Management Division (DRSEL-PA-M).
- (2) Incorporate into all CECOM equipment contracts the applicable Deterioration Prevention and Control Programs requirements.
- (3) Insure that CECOM DPAO is cognizant of deterioration prevention actions initiated by the Procurement and Production Directorate. In major actions, forward to the CECOM DPAO deterioration-related information on equipment under the jurisdiction of the Procurement and Production Directorate, including progress reports.

s. The Directors of Maintenance Engineering and Materiel Management

will:

(1) Designate the deterioration-cognizant organizational elements or personnel who will act as the Directorate contact and participate as members of the CECOM Materiel Deterioration Prevention Technical Working Group. Notify the Chief, Technology and Test Management Division (DRSEL-PA-M), of the names of personnel selected.

(2) Maintain a deterioration prevention and control program applicable to CECOM equipment during the storage, supply, and operations use periods. The Director of Materiel Management shall have primary responsibility for the program and the Director of Maintenance Engineering shall provide support as required.

(3) Exert continued efforts in identifying areas of deficiency existing in deterioration prevention practices.

(4) Insure that copies of all feedback data including QDR, SDR, SDC and TMM System revealing unsatisfactory equipment conditions attributed to deterioration are forwarded to applicable functional directorates.

(5) Provide the CECOM DPAO with copies of all information on deterioration-related problems and proposed solutions thereof encountered during the supply and maintenance phase.

t. All Other Command Elements will report any deterioration detected on CECOM systems and associated equipment for which they have responsibility to the DPAO for deterioration review, and to the appropriate Directorate, Project Office, and/or Development Center in order that they may be alerted to possible analogous conditions in other areas and take corrective action.

Page 7, paragraph 6, Procedures. Add subparagraph j after subparagraph i as follows:

j. CECOM Procedure.

(1) The Comptroller will provide staff guidance, direction, and coordination for the budgetary and funding aspects of each organization's current year and future years Deterioration Prevention • and Control Program planning and execution.

(2) As applicable, the directors, chiefs, commanders and project managers referred to in paragraph 2, this supplement, will include funding requirements for the conduct of Deterioration Prevention and Control studies, and related expenses, in budget estimates and operating budgets. These actions will be taken in accordance with the procedures established and published by the Comptroller.

Page 12, paragraph 7, Procedures. Add subparagraphs d-e-f after subparagraph c as follows:

7. References:

d. AR's 70-10, 70-15, 310-25, 702-3, 702-9, 702-10, and 702-11.

e. DARCOM-R's 70-7 and 702-24 with CECOM Supplement #1.

f. MIL-STD - 109

MIL-STD - 1521

MIL-STD - 810

MIL-STD - 454

MIL-STD - 965

MIL-STD - 38510

MIL-STD - 202

MIL-STD - 883

MIL-P - 14072

MIL-F - 14256

MIL-P - 28809

MIL-1 - 46058

CECOM "Corrosion Prevention and Control Application Guide".

Page A-1: Appendix A: Add or modify as follows:

Page A-1 through A-14. When there is a conflict between specifications cited and MIL-P-11268 (Parts, Materials and Processes Used in Electronic Equipment), CECOM organizational elements will utilize MIL-P-11268, MIL-STD-484, MIL-STD-810 and MIL-F-14072.

Page A-5, paragraph 1.7.1, Finish Specification. At the end of the final sentence, add the following: Instead of MIL-STD-186 or MIL-STD-171, CECOM organizational elements will utilize MIL-F-14072.

Page A-9, paragraph 1.8.11, Tropic - Proofing: This paragraph, as written, shall not apply for CECOM equipments. Instead the following shall be substituted:

Tropic Proofing: For CECOM equipments, the requirements of MIL-P-11268, Paragraph 3.8. "Tropicalization (moisture, humidity, salt spray and fungus resistance of materials and parts)" shall apply. Except for non-standard parts, old equipments, or commercial quality types, tropic proofing coatings shall not be used since for new equipments, parts, materials and processes should be selected which are inherently resistant to moisture and fungus effects without tropic proofing coatings. Tropic proofing coatings can only be used with Government approval. Printed wiring assemblies should all be conformally coated in accordance with MIL-I-46058.

Appendix B, Page B-1: Modify MADPAC Program. Plan to read: The plan will define the scope and depth of the contractor's efforts for prevention of CECOM materials deterioration and control based upon MIL-P-11268, MIL-STD-454, MIL-ST-810, MIL-F-14072, MIL-I-46058 and MIL-P-28809.

Appendix B, Page B-2: Add (10).

(10) For CECOM, the Plan will include the following:

(a) A detailed Deterioration/Corrosion Prevention and Control Plan (D/C P&C Plan) which will assure that the electronic system/equipment being procured will be developed, designed and manufactured to perform without deterioration and within their specified operational characteristics for a specified field service life under the adverse environmental conditions that may be encountered during storage, transportation and tactical use in Army environments and intended platform use.

(b) A review of the ROC, the Letter of Need, definition of Mission Profiles, Operational Modes, intended platform usage, field service life shall be conducted and the plan for satisfying these usage profiles shall be included in the Deterioration Prevention & Control Plan.

(c) A listing of all design plans, material selection, process and quality controls which will impact on the D/C P&C Plan

(d) A description of a Control Plan which reviews all design decisions, material selections and process control changes for their impact on D/C P&C Plan.

Appendix B, Page B-2 add 11.

11. Environmental Tests Plans: The Contractor shall develop designs, material use and process control plans to assure that no evidence of corrosion or deterioration will occur when the equipment is subjected to the environmental tests usually included in the TEMP and the equipment specifications ie: Salt Fog, Method 502, Humidity Method 507, Fungus 508 of MIL-STD-810 and as specified in the equipment specification. Also, no residual water shall enter and be trapped inside the equipment when subjected to the Rain Test, Method 506 and no moisture shall enter the sealed enclosure when subjected the Leakage (Immersion) Methods 512, and no materials used shall support the growth of fungus when subjected to the Fungus Test Methods 508 per MIL-STD-810.